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PATENT & TRADEMARK OFFICE

**MAIL STOP APPEAL**
**BRIEF - PATENTS**

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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| Applicant: | A.F. Champernowne | Attorney Docket No.: EXIN117029 |
| Application No.: | 09/825,451 | Group Art Unit: 3629 |
| Filed: | April 2, 2001 | Examiner: J.A. Mooneyham |
| Title: | OPTIMIZED SYSTEM AND METHOD FOR FINDING BEST FARES | |

TRANSMITTAL OF APPEAL BRIEF

Seattle, Washington 98101

July 12, 2004

TO THE COMMISSIONER FOR PATENTS:

A. Appeal Brief Transmittal

Enclosed herewith for filing in the above-identified application is an Appeal Brief in triplicate. Also enclosed is our Check No. 156681 in the amount of $330.00.

The Commissioner is hereby authorized to charge any fees under 37 C.F.R. §§ 1.16, 1.17 and 1.18 which may be required during the entire pendency of the application, or credit any overpayment, to Deposit Account No. 03-1740. This authorization also hereby includes a request for any extensions of time of the appropriate length required upon the filing of any reply during the entire prosecution of this application. A copy of this sheet is enclosed.

Respectfully submitted,

CHRISTENSEN O'CONNOR
JOHNSON KINDNESS PLLC

Maria L. Čulić Anderson

Maria L. Čulić Anderson
Registration No. 40,574
Direct Dial No. 206.695.1714

I hereby certify that this correspondence is being deposited with the U.S. Postal Service in a sealed envelope as first class mail with postage thereon fully prepaid and addressed to Mail Stop Appeal Brief - Patents, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on the below date.

Date: July 12, 2004 Lori A. Lewis

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LAW OFFICES OF
CHRISTENSEN O'CONNOR JOHNSON KINDNESS PLLC
1420 Fifth Avenue
Suite 2800
Seattle, Washington 98101
206.682.8100

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**MAIL STOP APPEAL**

**BRIEF - PATENTS**

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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

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APPELLANT'S APPEAL BRIEF

Seattle, Washington 98101

July 12, 2004

**TO THE COMMISSIONER FOR PATENTS:**

This brief is in support of a Notice of Appeal filed in the above-identified application on May 10, 2004, to the Board of Patent Appeals and Interferences appealing the decision dated February 10, 2004, of the Primary Examiner finally rejecting Claims 1-36.



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CHRISTENSEN O'CONNOR JOHNSON KINDNESS[PLLC]
1420 Fifth Avenue
Suite 2800
Seattle, Washington 98101
206.682.8100

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CHRISTENSEN O'CONNOR JOHNSON KINDNESS[PLLC]
1420 Fifth Avenue
Suite 2800
Seattle, Washington 98101
206.682.8100

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LAW OFFICES OF
CHRISTENSEN O'CONNOR JOHNSON KINDNESS[PLLC]
1420 Fifth Avenue
Suite 2800
Seattle, Washington 98101
206.682.8100

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LAW OFFICES OF
CHRISTENSEN O'CONNOR JOHNSON KINDNESS[PLLC]
1420 Fifth Avenue
Suite 2800
Seattle, Washington 98101
206.682.8100

## I. REAL PARTY IN INTEREST

The subject application is owned by Expedia, Inc., of Bellevue, Washington.

## II. RELATED APPEALS AND INTERFERENCES

Upon information and belief, appellant does not have any knowledge of related appeals or interferences that may directly affect or have a bearing on the decision of the Board of Appeals and Interferences (hereinafter "the Board") in the pending appeal.

## III. STATUS OF THE CLAIMS

On April 2, 2001, the pending application was filed including Claims 1-36. On July 2, 2003, the Examiner in charge of the pending patent application issued a first Office Action rejecting Claims 1-36. On October 28, 2003, appellant filed an amendment and response in which Claims 1, 2, and 13-26 were amended, no claims were canceled, and no claims were added. The amendments to the claims were directed at addressing typographical errors found in the original claims and addressing the Examiner's 35 U.S.C. § 101/112 rejection for failing to recite statutory subject matter in the claims.

On February 10, 2004, the Examiner issued a second Office Action (hereafter the "final Office Action"), finally rejecting Claims 1-36. In that final Office Action, some of the pending claims were rejected under 35 U.S.C. § 102(e), while the remainder of the claims were rejected under 35 U.S.C. § 103(a). Additionally, while the Examiner acknowledged that the preambles of the amended claims were amended to include the requisite statutory subject matter, the Examiner persisted in maintaining the previous 35 U.S.C. § 101/112 rejection in regard to some of the claims, insisting that the statutory subject matter must be recited, not in the preamble, but "in the body of the claims." (Final Office Action, pg. 3, first paragraph.)



LAW OFFICES OF
CHRISTENSEN O'CONNOR JOHNSON KINDNESS PLLC
1420 Fifth Avenue
Suite 2800
Seattle, Washington 98101
206.682.8100

On April 27, 2004, appellant's representative conducted an in-person interview with the Examiner and the Examiner's Supervising Examiner. A primary topic of discussion in the in-person interview was whether U.S. Patent No. 6,295,521 to DeMarcken et al. (hereinafter "DeMarcken"), the principal reference relied upon in rejecting Claims 1-36, anticipated the independent claims of the present application, in particular Claims 1, 13, and 25. Another primary topic of discussion was directed at proposed amendments to the pending claims to overcome the 35 U.S.C. § 101/112 rejections. While the Examiners agreed that reciting the statutory subject matter currently in the preambles in the body of the claims would likely overcome the 35 U.S.C. § 101/112 rejections, unfortunately, no agreement was reached as to whether DeMarcken anticipated the pending independent claims.

On May 10, 2004, appellant filed a Notice of Appeal and an Amendment and Response After Final Rejection in which appellant amended Claims 1 and 25 to positively recite technological subject matter in the body of the claims rather than the preamble of the claims. With the Amendment and Response, no claims were canceled and no claims were added.

On June 22, 2004, the Examiner issued an advisory action stating that the amendments filed in the Amendment and Response After Final Rejection (filed concurrently with the Notice of Appeal) would not be entered because they raised new issues that would require further consideration and/or search.

## IV. STATUS OF AMENDMENTS

As indicated above, concurrently with filing the Notice of Appeal, on May 10, 2004, appellant submitted amendments to Claims 1 and 25. The amendments were consistent with the Examiner's request that the technological art, previously recited in the preambles of the pending claims, be recited in the body of the claims. The remaining subject matter of the claims, however, was not amended. On June 22, 2004, the Examiner issued an Advisory Action stating



LAW OFFICES OF
CHRISTENSEN O'CONNOR JOHNSON KINDNESS PLLC
1420 Fifth Avenue
Suite 2800
Seattle, Washington 98101
206.682.8100

that the amendments would not be entered because they raised new issues that would require further consideration or search.

The claims, including the proposed amendments, are set forth below under Section X, Appendix of Claims Involved in the Appeal. In order to identify the proposed amendments for the Board, deletions to the claims are ~~stricken out~~ and additions are <u>underlined</u>. As will be discussed below, appellant believes that the rejected amendments to the claims resolve the 35 U.S.C. § 101/112 rejections raised by the Examiner during the final Office Action.

## V. SUMMARY OF THE INVENTION

The present invention is directed towards a system, method, and computer readable medium for finding the best air fares available for a potential traveler/customer. In particular, the present invention finds the best air fares available for a customer in a computationally non-prohibitive manner in response to a fare request from a customer.

In practice, typical "best fare" search engines explicitly examine complete fare solutions (which would include multiple flight segments) in order to determine the "best fare" available. Complete fare solutions are fare solutions that will take a flyer from an origin to a destination, and may include multiple flight segments. For example, a complete fare solution from Boston to Los Angeles may be a single, direct flight, or alternatively, may be a composite of multiple flight segments, such as a first flight segment to Chicago, followed by a flight segment to Denver, and a final segment to Los Angeles.

The typical "best fare" search engines actually examine only a small subset of complete fare solutions between an origin and destination in response to a fare request. In other words, numerous complete fare solutions are frequently disregarded when determining a "best fare." Only a subset of complete fare solutions are examined because (a) they must be explicitly examined, and (b) the number of permutations available may soar from several dozen to tens of



LAW OFFICES OF
CHRISTENSEN O'CONNOR JOHNSON KINDNESS[PLLC]
1420 Fifth Avenue
Suite 2800
Seattle, Washington 98101
206.682.8100

thousands. As a consequence, examining the complete set of complete fare solutions would be computationally prohibitive. Unfortunately, as indicated above, by examining only a subset of complete fare solutions, typical "best fare" search engines easily and often disregard complete fare solutions that are available to the consumer at lower prices than those examined.

In contrast to the current best fare search engines, the present invention, at least implicitly, examines substantially all available complete fare solutions to determine the lowest fare available for the consumer. Furthermore, the implicit examination of all complete fare solutions is performed in a computationally non-prohibitive manner using a solution tree. A solution tree is a tree structure that represents a progression of fare solutions, i.e., as fare solutions are built beginning with partial fare solutions at the root node of the solution tree, to complete fare solutions at the solution tree's leaf nodes. At each level in the solution tree, more trip information is added to the previous level's partial fare solutions, such that fare solutions of each subsequent level are more complete fare solutions than those of the previous level.

As an example, the partial fare solution at the root node typically only includes the origin and destination as requested by a consumer. At the first level from the root node, the query server generates new partial fare solutions in the solution tree to breakpoints, i.e., routes between the origin and destination including identifiable segments. These routes represent all of the various "paths" that a traveler might take between the origin and destination specified in the fare request. After generating the first level of partial fare solutions, a second level of partial fare solutions is created in the solution tree by adding additional trip information, such as carrier data, to the previous partial fare solutions. A third level in the solution tree may then be created by assigning specific flights to the previous level's partial fare solutions. This process continues, with each iteration creating new levels in the solution tree, until all trip information is added, whereupon the leaf nodes, i.e., the fare solutions, in the last level in the solution tree are no longer partial fare solutions, but rather complete fare solutions.

Without other action, by adding additional information to partial fare solutions of previous levels, the number of nodes in the solution tree can grow exponentially, and examining the resulting complete fare solutions in the solution tree would be computationally prohibitive. However, in addition to the additive process described above, as trip information is added to partial fare solutions, those partial fare solutions that are determined to be non-optimal are removed from further processing in the solution tree. By removing non-optimal nodes from the solution tree, the growth of the solution tree is minimized to include only optimal solutions, such that when the solution tree is completed (with optimal complete fare solutions), it is computationally feasible to examine the complete fare solutions in the solution tree.

Determining whether a partial fare solution is optimal can be made in a variety of manners based on the consumer's request/query. For example, after a threshold price, based on previous samplings of fares between the origin and destination, has been established, any partial fare solution that exceeds that threshold price need not be further processed to completion. Alternatively, if a nonstop flight is requested between an origin and destination, those partial fare solutions that include more than one flight segment would be excluded from further processing.

By evaluating the partial fare solutions and removing the non-optimal partial fare solutions from further processing it can be said that all complete fare solutions are at least implicitly examined. In other words, all possible complete fare solutions are not explicitly examined because not all complete fare solutions are built. However, those that are not built are implicitly examined because, prior to completion, they have been determined to be non-optimal fare solutions and would remain non-optimal if processed to complete fare solutions.

Other fare search systems, such as DeMarcken, use yet other processes to provide consumers with fare information. In the DeMarcken example, the system first generates all complete fare solutions, both optimal and non-optimal fare solutions. These complete fare solutions are then organized in a storage structure to facilitate their manipulation. Then, in

response to a customer query, the DeMarcken system manipulates the storage structure to extract the complete fare solutions (which may include optimal and non-optimal fare solutions) that meet the customer's query. Clearly, in contrast to the present invention, substantial computational effort is expended by this system in first generating the complete fare solutions (both optimal and non-optimal complete fare solutions) and distilling them into the storage structure. Additionally, no effort is expended by the present invention to generate non-optimal complete fare solutions, as only optimal complete fare solutions are ever constructed.

**Explanation of the Invention as Defined in the Claims**

Claims 1-12

Independent Claim 1 is directed at a method for finding at least one best fare for a trip. The method comprises, at a query server in response to a fare query from a client computer, determining a set of partial fare solutions for the trip. (Specification, pg. 16, lines 27-31.) Trip information is added to the set of partial fare solutions in order to define a set of complete fare solutions. (Specification, pg. 19, lines 20-30.) As trip information is added to the partial fare solutions, partial fare solutions that are non-optimal partial solutions are eliminated. (Specification, pg. 21, line 31 - pg. 22, line 2.) Thereafter, a subset of said complete fare solutions as the best fares for the trip is returned. (Specification, pg. 21, lines 19-21.)

Claims 2-12 are dependent from Claim 1, and are directed to the following additional recitations. Claim 2 recites that adding trip information to the partial fare solutions comprises: supplying the fare query to a root node in a solution tree; assigning fare components corresponding to said root node to a plurality of first nodes; assigning at least one carrier corresponding to said first nodes to a plurality of second nodes; assigning at least one flight corresponding to said second nodes to a plurality of third nodes; assigning at least one priceable unit corresponding to said third nodes to a plurality of fourth nodes; and assigning at least one fare corresponding to said fourth nodes to a plurality of leaf nodes. (Specification, pg. 27, line 9

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CHRISTENSEN O'CONNOR JOHNSON KINDNESS PLLC
1420 Fifth Avenue
Suite 2800
Seattle, Washington 98101
206.682.8100

- pg. 28, line 12.) Claim 3 recites that the subset of complete fare solutions is a predetermined number of lowest cost fare solutions. (Specification, pg. 28, lines 19-23.) Claim 4 recites that subset of complete fare solutions is an exhaustive set of said complete fare solutions. (Specification, pg. 30, original Claim 4.)

Claim 5 recites that adding trip information and eliminating partial fare solutions are performed in a recursive manner. (Specification, pg. 29, lines 20-25.) Claim 6 recites that adding trip information and eliminating partial fare solutions are performed in an iterative manner. (Specification, pg. 29, lines 20-25.) Claim 7 recites that the partial fare solutions are eliminated based on a threshold cost. (Specification, pg. 27, lines 24-26.) Claim 8 recites that the partial fare solutions are eliminated based on a refined lower bound. (Specification, pg. 18, lines 1-10.) Claim 9 recites that the partial fare solutions are stored in a priority queue. (Specification, pg. 11, lines 21-27.) Claim 10 recites that the complete fare solutions are retrieved from a priority queue. (Specification, pg. 11, lines 21-27.) Claim 11 recites that adding trip information and eliminating partial fare solutions are performed as part of a branch-and-bound best fare search routine. (Specification, pg. 16, lines 19-26.) Claim 12 recites that adding trip information and eliminating partial fare solutions are performed both backward and forward from a destination and origin. (Specification, pg. 29, lines 9-25.)

Claims 13-24

Independent Claim 13 is directed at a computer-readable medium containing computer-executable instructions. When executed on a computing device, the instructions carry out a method for finding at least one best fare for a trip. The method comprises determining a set of partial fare solutions for the trip. (Specification, pg. 16, lines 27-31.) Trip information is added to the set of partial fare solutions in order to define a set of complete fare solutions. (Specification, pg. 19, lines 20-30.) As trip information is added to the partial fare solutions, partial fare solutions that are non-optimal partial solutions are eliminated. (Specification, pg. 21,



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CHRISTENSEN O'CONNOR JOHNSON KINDNESS[PLLC]
1420 Fifth Avenue
Suite 2800
Seattle, Washington 98101
206.682.8100

line 31 - pg. 22, line 2.) Thereafter, a subset of said complete fare solutions as the best fares for the trip is returned. (Specification, pg. 21, lines 19-21.)

Claims 14-24 are dependent from Claim 13, and are directed to the following additional recitations. Claim 14 recites that adding trip information to the partial fare solutions comprises: supplying the fare query to a root node in a solution tree; assigning fare components corresponding to said root node to a plurality of first nodes; assigning at least one carrier corresponding to said first nodes to a plurality of second nodes; assigning at least one flight corresponding to said second nodes to a plurality of third nodes; assigning at least one priceable unit corresponding to said third nodes to a plurality of fourth nodes; and assigning at least one fare corresponding to said fourth nodes to a plurality of leaf nodes. (Specification, pg. 27, line 9 - pg. 28, line 12.) Claim 15 recites that the subset of complete fare solutions is a predetermined number of lowest cost fare solutions. (Specification, pg. 28, lines 19-23.) Claim 16 recites that subset of complete fare solutions is an exhaustive set of said complete fare solutions. (Specification, pg. 30, original Claim 4.)

Claim 17 recites that adding trip information and eliminating partial fare solutions are performed in a recursive manner. (Specification, pg. 29, lines 20-25.) Claim 18 recites that adding trip information and eliminating partial fare solutions are performed in an iterative manner. (Specification, pg. 29, lines 20-25.) Claim 19 recites that the partial fare solutions are eliminated based on a threshold cost. (Specification, pg. 27, lines 24-26.) Claim 20 recites that the partial fare solutions are eliminated based on a refined lower bound. (Specification, pg. 18, lines 1-10.) Claim 21 recites that the partial fare solutions are stored in a priority queue. (Specification, pg. 11, lines 21-27.) Claim 22 recites that the complete fare solutions are retrieved from a priority queue. (Specification, pg. 11, lines 21-27.) Claim 23 recites that adding trip information and eliminating partial fare solutions are performed as part of a branch-and-bound best fare search routine. (Specification, pg. 16, lines 19-26.) Claim 24 recites that



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CHRISTENSEN O'CONNOR JOHNSON KINDNESS PLLC
1420 Fifth Avenue
Suite 2800
Seattle, Washington 98101
206.682.8100

adding trip information and eliminating partial fare solutions are performed both backward and forward from a destination and origin. (Specification, pg. 29, lines 9-25.)

Claims 25-36

Independent Claim 25 is directed at a query server apparatus in a communication network finding at least one best fare for a trip. The query server apparatus comprises a processor and a memory coupled to the processor. The memory stores program code, which when executed in response to a fare query, causes the apparatus to perform the following: determining a set of partial fare solutions for the trip. (Specification, pg. 16, lines 27-31.) Trip information is added to the set of partial fare solutions in order to define a set of complete fare solutions. (Specification, pg. 19, lines 20-30.) As trip information is added to the partial fare solutions, partial fare solutions that are non-optimal partial solutions are eliminated. (Specification, pg. 21, line 31 - pg. 22, line 2.) Thereafter, a subset of said complete fare solutions as the best fares for the trip is returned. (Specification, pg. 21, lines 19-21.)

Claims 26-36 are dependent from Claim 25, and are directed to the following additional recitations. Claim 26 recites that adding trip information to the partial fare solutions comprises: supplying the fare query to a root node in a solution tree; assigning fare components corresponding to said root node to a plurality of first nodes; assigning at least one carrier corresponding to said first nodes to a plurality of second nodes; assigning at least one flight corresponding to said second nodes to a plurality of third nodes; assigning at least one priceable unit corresponding to said third nodes to a plurality of fourth nodes; and assigning at least one fare corresponding to said fourth nodes to a plurality of leaf nodes. (Specification, pg. 27, line 9 - pg. 28, line 12.) Claim 27 recites that the subset of complete fare solutions is a predetermined number of lowest cost fare solutions. (Specification, pg. 28, lines 19-23.) Claim 28 recites that subset of complete fare solutions is an exhaustive set of said complete fare solutions. (Specification, pg. 30, original Claim 4.)



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CHRISTENSEN O'CONNOR JOHNSON KINDNESS[PLLC]
1420 Fifth Avenue
Suite 2800
Seattle, Washington 98101
206.682.8100

Claim 29 recites that adding trip information and eliminating partial fare solutions are performed in a recursive manner. (Specification, pg. 29, lines 20-25.) Claim 30 recites that adding trip information and eliminating partial fare solutions are performed in an iterative manner. (Specification, pg. 29, lines 20-25.) Claim 31 recites that the partial fare solutions are eliminated based on a threshold cost. (Specification, pg. 27, lines 24-26.) Claim 32 recites that the partial fare solutions are eliminated based on a refined lower bound. (Specification, pg. 18, lines 1-10.) Claim 33 recites that the partial fare solutions are stored in a priority queue. (Specification, pg. 11, lines 21-27.) Claim 34 recites that the complete fare solutions are retrieved from a priority queue. (Specification, pg. 11, lines 21-27.) Claim 35 recites that adding trip information and eliminating partial fare solutions are performed as part of a branch-and-bound best fare search routine. (Specification, pg. 16, lines 19-26.) Claim 36 recites that adding trip information and eliminating partial fare solutions are performed both backward and forward from a destination and origin. (Specification, pg. 29, lines 9-25.)

## VI. ISSUES PRESENTED FOR REVIEW

In response to the February 10, 2004, final Office Action (hereinafter "Office Action"), the following issues are presented to the Board of Patent Appeals and Interferences (hereinafter the "Board"):

1. Whether Claims 1, 3, 9, 10, 13, 15, 21, 22, 25, 27, 33, and 34 are anticipated by DeMarcken;

2. Whether Claims 2, 14, and 26 are obvious in view of DeMarcken;

3. Whether Claims 4-8, 12, 16-20, 24, 28-32, and 36 are obvious in view of DeMarcken and in further view of International Publication No. WO 01/29693 to Sabre Inc. (hereinafter "Sabre"); and



LAW OFFICES OF
CHRISTENSEN O'CONNOR JOHNSON KINDNESS[PLLC]
1420 Fifth Avenue
Suite 2800
Seattle, Washington 98101
206.682.8100

4. Whether Claims 1 and 25, according to the proposed amendments listed in Appendix X, recite statutory subject matter as required by 35 U.S.C. §§ 101 and 112, second paragraph.

## VII. GROUPING OF CLAIMS

Claims 1, 3, 9, 10 and 11 stand or fall together; each of Claims 2, 4, 5, 6, 7, 8 and 12 stands or falls alone; Claims 13, 15, 21, 22 and 23 stand or fall together; each of Claims 14, 16, 17, 18, 19, 20 and 24 stands or falls alone; Claims 25, 27, 33, 34 and 35 stand or fall together; and each of Claims 26, 28, 29, 30, 31, 32 and 36 stands or falls alone. The reason why the grouped claims are believed to be separately patentable are explained below in the arguments.

## VIII. ARGUMENTS

Prior to presenting appellant's arguments as to why appellant believes that the Examiner's rejections of Claims 1-36 were in error and should be overturned, a brief description of the cited and applied references is presented.

### Summary of DeMarcken

DeMarcken presents an airline travel planning system including a server computer that, in response to a search request, generates a set of **complete** pricing solutions, including **both** optimal and non-optimal pricing solutions. This set of complete pricing solutions is then stored in a data structure, more specifically, a directed acyclical graph (DAG), frequently referred to in DeMarcken as the pricing graph. (See DeMarcken, Abstract, Col. 5, lines 36-41.) The complete pricing solutions, stored in the pricing graph, are returned to a client computer. (DeMarcken, Col. 5, lines 46-50.) Once the client computer has received the complete pricing solutions, the complete pricing solutions can be locally manipulated according to user preferences, including "enumerat[ing] pricing solutions from the directed acyclical graph (DAG) representation." (DeMarcken, Col. 5, lines 48-50.)



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CHRISTENSEN O'CONNOR JOHNSON KINDNESS[PLLC]
1420 Fifth Avenue
Suite 2800
Seattle, Washington 98101
206.682.8100

Thus, in contrast to the present invention, DeMarcken generates a set of complete pricing solutions, up to tens of billions of solutions, stores them in the pricing graph, and forwards the complete pricing solutions to the client computer. Only after the complete pricing solutions are generated and stored in the pricing graph, and at the client computer, is the pricing graph manipulated to find the lowest pricing solutions contained within.

**Summary of Sabre**

Sabre purportedly discloses a method for searching for low fares using a virtual network. The virtual network is constructed from the paths between a specified origin and destination. The paths may include intermediate locations (i.e., non-direct flights between the origin and destination), which are included in the virtual network. Once constructed, the various paths in the virtual network represent **complete** fare solutions, including both optimal and non-optimal fare solutions.

After Sabre's virtual network is constructed, various fare information can be extracted from the virtual network, including the lowest fares between an origin and destination. To extract the lowest fares between the origin and destination from the virtual network, the Sabre system employs various algorithms which, in essence, add up the costs of the various segments of each complete fare solution between the origin and destination. By determining the costs for each complete fare solution, and comparing the costs of complete fare solutions, the Sabre system can identify which solutions represent the optimal, lowest price fare solutions.

Obviously, Sabre constructs and stores both optimal and non-optimal fare solutions in the virtual network. If Sabre constructed only optimal fare solutions, Sabre would have no reason to provide algorithms to extract the optimal solutions from the virtual network. Indeed, Sabre is similar to DeMarcken in that complete fare solutions, including both optimal and non-optimal solutions, are generated and stored in a storage structure. According to Sabre and DeMarcken, after both optimal and non-optimal solutions are constructed the optimal fare solutions can be

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CHRISTENSEN O'CONNOR JOHNSON KINDNESS[PLLC]
1420 Fifth Avenue
Suite 2800
Seattle, Washington 98101
206.682.8100

identified. In contrast to Sabre and DeMarcken, according to the present invention, only optimal fare solutions are processed to completion. Accordingly, the present invention does not require an extraction (or enumeration) process to identify which, of all complete fare solutions, are optimal fare solutions.

**Issue 1: Whether DeMarcken Anticipates Claims 1, 3, 9-11, 13, 15, 21-23 and 25, 27 and 33-35**

Claims 1, 13, and 25

Claims 1, 13, and 25 were rejected in the final Office Action under 35 U.S.C. § 102(e) as being anticipated by DeMarcken. More specifically, it was asserted that DeMarcken teaches the following recitations common to each of Claims 1, 13, and 25:

> "determining a set of partial fare solutions for the trip,"
>
> "adding trip information to the partial fare solutions in order to define a set of complete fare solutions for the trip," and
>
> "as trip information is added to the partial fare solutions, eliminating partial fare solutions that are non-optimal partial solutions."

As discussed below, appellant respectfully disagrees.

DeMarcken Fails to Disclose "Determining a Set of Partial Fare Solutions"

The final Office Action cites DeMarcken, Col. 51, *Finding the Best Pricing Solution*, lines 26-29, and Col. 55, lines 54-56, in support of its assertion that DeMarcken discloses "determining a set of partial fare solutions." Appellant asserts that this is a mischaracterization of what DeMarcken discloses. The entire section, *Finding the Best Pricing Solution*, is directed at DeMarcken's system for extracting a subset of pricing solutions that match certain criteria from a large set of complete pricing solutions that has already be defined. Thus, the so-called "partial pricing-solutions" in the cited passages are nothing more than intermediate



LAW OFFICES OF
CHRISTENSEN O'CONNOR JOHNSON KINDNESS^PLLC
1420 Fifth Avenue
Suite 2800
Seattle, Washington 98101
206.682.8100

computational placeholders for extracting information regarding the *complete* solutions (both optimal and non-optimal) that already exist in the pricing graph during the enumeration algorithm/process. (DeMarcken, Col. 54, lines 50-65.) In fact, these partial pricing-solutions can hardly be viewed as partial fare solutions as they are generated after the pricing graph has been generated. Clearly, they are not "a set of partial fare solutions" to which trip information is added to then define a set of complete fare solutions, as recited in Claims 1, 13, and 25.

DeMarcken Fails to Disclose Adding Trip Information to Partial Fare Solutions To Define a Set of Complete Fare Solutions For the Trip

The final Office Action cites DeMarcken, Figures 3, and 19-27; Col. 5, lines 1-4; and Col. 51, lines 54-56, in support of its assertion that DeMarcken discloses "adding trip information to the partial fare solutions in order to define a set of complete fare solutions for the trip." However, even assuming that DeMarcken discloses determining a set of partial fare solutions, which appellant expressly denies, appellant asserts that DeMarcken fails to disclose "adding trip information to the partial fare solutions in order to define a set of complete fare solutions for the trip," as commonly recited in Claims 1, 13, and 25. More specifically, if the computational placeholders disclosed by DeMarcken are considered the equivalent of partial fare solutions, then it would also be necessary for DeMarcken to disclose "adding trip information" to such placeholders in order to anticipate this element of Claims 1, 13 and 25. As a threshold issue, appellant notes that trip information cannot be added to a mere computational placeholder. However, even if it could, DeMarcken makes no such disclosure. Rather, as discussed below, DeMarcken discloses various methods of **extracting** or **deleting** *complete fare solutions* from a larger set of complete fare solutions, as opposed to **adding** *trip information* to partial fare solutions in order to define a set of complete fare solutions as required by Claims 1, 13 and 25.



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1420 Fifth Avenue
Suite 2800
Seattle, Washington 98101
206.682.8100

The final Office Action asserted that DeMarcken, Col. 5, lines 1-4, and Figure 3 describe the faring process that takes large numbers of complete fare solutions, generated by the scheduling process, and determines which complete fare solutions are valid. In other words, the faring process **deletes** invalid complete fare solutions from the superset of complete fare solutions generated by the scheduling process. Clearly, **deleting** *complete fare solutions* from a larger set of solutions is not the same as **adding** *trip information* to partial fare solutions in order to define a set of complete fare solutions, as commonly recited in Claims 1, 13, and 25.

The final Office Action also cited DeMarcken, Figures 19-27 as disclosing the "adding trip information" element. However, these figures merely disclose that the pricing graph 38 can be manipulated, not that "trip information" can be "added" to DeMarcken's computational placeholders. For example, Figure 19 of DeMarcken refers to user manipulable "processes or operations on the pricing graph 38'." In other words, Figure 19 (and its corresponding text) describes various processes and operations available to a user to manipulate the complete pricing solutions stored in the pricing graph. Similarly, Figures 20-27 are illustrative of a sample user interface through which a user interacts with the enumeration process to manipulate the pricing graph/storage structure. Clearly, manipulating complete solutions stored in a storage structure is not the equivalent of "adding trip information to the set of partial fare solutions to define a set of complete fare solutions for the trip."

The final Office Action further cited DeMarcken, Col. 51, lines 35-45 as disclosing the "adding trip information" element. However, this passage is directed to the DeMarcken enumeration process used to extract a subset of complete pricing solutions from the storage structure that includes both optimal and non-optimal complete pricing solutions. DeMarcken's enumeration process **extracts** complete pricing solutions from the storage structure (pricing graph 38 or pricing graph 38'). **Extracting** existing, *complete pricing solutions* from a larger set of solutions is not the equivalent of **adding** *trip information* to partial fare solutions in order to



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1420 Fifth Avenue
Suite 2800
Seattle, Washington 98101
206.682.8100

define a set of complete fare solutions for the trip, as is commonly recited in Claims 1, 13, and 25.

DeMarcken et al. Fail to Teach "As Trip Information Is Added, Eliminating Partial Fare Solutions That Are Non-Optimal Partial Solutions"

Appellant respectfully asserts that, in addition to entirely failing to disclose adding trip information to partial fare solutions to define complete fare solutions, DeMarcken further fails to disclose that "as trip information is added to the partial fare solutions, eliminating partial fare solutions that are non-optimal partial solutions," as commonly recited in Claims 1, 13, and 25. In fact, appellant asserts that DeMarcken discloses the opposite of "eliminating partial fare solutions that are non-optimal partial fare solutions."

As a preliminary matter, appellant notes that DeMarcken explicitly discloses that **the typical number of pricing solutions generated by the scheduler process "ranges from tens of millions into hundreds of billions."** (DeMarcken et al., Col. 49, lines 19-23.) With such large numbers of pricing solutions being generated, necessitating both an efficient storage structure (pricing graph 38') and enumeration process to extract the complete pricing solutions from the storage structure, it is entirely illogical to assert that DeMarcken discloses eliminating non-optimal solutions as complete fare solutions are being built. In fact, DeMarcken makes no distinction between optimal and non-optimal solutions in building its complete pricing solutions. Clearly, if non-optimal solutions were removed as trip information was added, (1) the DeMarcken system would not generate tens of millions to hundreds of billions of pricing solutions, and (2) the DeMarcken system would not need an enumeration process to extract the optimal pricing solutions from the entire set of complete pricing solutions.

Now turning to the points raised in the final Office Action, the final Office Action cites to DeMarcken, Col. 5, lines 4-6; Col. 49, line 30 - Col. 50, line 39; Col. 2, lines 27-37; and

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1420 Fifth Avenue
Suite 2800
Seattle, Washington 98101
206.682.8100

Figure 19, as disclosing "as trip information is added to the partial fare solutions, eliminating partial fare solutions that are non-optimal partial solutions." In regard to DeMarcken, Col. 5, lines 4-6, this passage describes the faring process that validates the complete fare solutions generated by the scheduling process. Simply put, the faring process deletes complete fare solutions that are considered invalid. While this faring process does delete information, appellant notes that the DeMarcken faring process deletes complete pricing solutions after they are generated by the scheduling process. This is in clear contrast to the present invention where non-optimal partial fare solutions are eliminated "**as trip information is added**." Accordingly, non-optimal partial fare solutions for a trip are simply not retained by the claimed method and system in the first place. In contrast, DeMarcken retains all fare solutions, including both optimal and non-optimal solutions, in the data storage structure (i.e., pricing graph 38), and deletes the non-optimal (and complete) solutions only after all complete solutions have been generated.

The final Office Action also cited DeMarcken, Col. 49, line 30 - Col. 50, line 39 as disclosing "as trip information is added to the partial fare solutions, eliminating partial fare solutions that are non-optimal partial solutions." This passage discusses the enumeration process for extracting an optimal, complete pricing solutions from the superset of complete pricing solutions, that includes both optimal and non-optimal pricing solutions. Enumerating optimal complete pricing solutions from a superset of all complete pricing solutions cannot rationally be equated to eliminating partial fare solutions that are non-optimal partial solutions **as trip information is added to partial fare solutions**. Again, non-optimal partial fare solutions for a trip are simply not retained by the claimed method and system, whereas non-optimal (and complete) fare solutions are retained in the data storage structure (e.g., pricing graph 38) of DeMarcken.



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1420 Fifth Avenue
Suite 2800
Seattle, Washington 98101
206.682.8100

The final Office Action further cited DeMarcken, Col. 2, lines 27-37 as disclosing "as trip information is added to the partial fare solutions, eliminating partial fare solutions that are non-optimal partial solutions." This passage describes a manipulation process designed to "**eliminate** undesirable pricing solutions" generated by the scheduling process. In fact, the manipulation process operates on the pricing graph 38', referred to as the directed acyclical graph or "DAG", that contains the superset of complete pricing solutions. However, as with the faring process discussed above, this manipulation process eliminates complete solutions from a larger set of complete solutions stored in the DAG. This manipulation process does not eliminate partial fare solutions as trip information is added to the partial fare solutions.

For the reasons described above, appellant respectfully asserts that DeMarcken fails to disclose each element of independent Claims 1, 13, and 25. Accordingly, appellant respectfully requests that the Board overturn the 35 U.S.C. § 102(e) rejections of Claims 1, 13, and 25, and direct that the claims be allowed.

Claims 3, 9-11, 15, 21-23, 27 and 33-35

Claims 3 and 9-11 depend from independent Claim 1, Claims 15 and 21-23 depend from independent Claim 13, and Claims 27 and 33-35 depend from independent Claim 25. Thus, for the same reasons described above in regard to independent Claims 1, 13, and 25, appellant asserts that DeMarcken fails to disclose each element of these dependent claims, especially when read in conjunction with the independent claims from which they depend. Therefore, appellant requests that the Board overturn the 35 U.S.C. § 102(e) rejections of Claims 3, 9-11, 21-23, 27, and 33-35, and direct that the claims be allowed.

**Issue 2: Whether Claims 2, 14, and 26 Are Obvious In View Of DeMarcken**

Claims 2, 14, and 26, were rejected under 35 U.S.C. § 103(a) as being obvious in view of DeMarcken et al. More particularly, it is stated in the final Office Action that while DeMarcken



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1420 Fifth Avenue
Suite 2800
Seattle, Washington 98101
206.682.8100

does not disclose each element of these claims, "it would have been obvious to [one of] ordinary skill to include the assignment of nodes as set forth in Claim[s] 2, 14, [and] 26 since DeMarcken's system and method discloses a data structure comprising a plurality of nodes which can be logically manipulated or combined and this would include assigning the nodes as set forth in Claims 2, 14, and 26." (Final Office Action, page 6.) Appellant respectfully disagrees.

DeMarcken Fails to Teach or Suggest Each Element of The Independent Claims

As a preliminary matter, Claims 2, 14, and 26 depend from independent Claims 1, 13, and 25. As DeMarcken fails to disclose each element of Claims 1, 13, and 25, it follows that DeMarcken also fails to disclose, teach or suggest each element of dependent Claims 2, 14, and 26, especially when these dependent claims read in combination with the independent claims from which they depend.

To establish *prima facie* obviousness of a claimed invention, three basic criteria must be met: (1) there must be some suggestion or motivation to combine the references, (2) there must be reasonable expectation of success, and (3) the prior art reference or references must teach or suggest each element of the claim. *In re Vaeck*, 947 F.2d 488, 20 U.S.P.Q.2d 1438 (Fed. Cir. 1991). See also, M.P.E.P. § 2143. As DeMarcken fails to disclose each element of Claims 1, 13, and 25, and therefore also fails to disclose, teach or suggest each element of dependent Claims 2, 14, and 26, part (3) of the three basic requirements for a proper *prima facie* obviousness rejection is not met.

DeMarcken Fails to Teach or Suggest The Additional Elements Recited In The Claims

Claims 2, 14, and 26 each include the following recitations in common:

> "assigning the fare components corresponding to said root node to a plurality of first nodes;"



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1420 Fifth Avenue
Suite 2800
Seattle, Washington 98101
206.682.8100

"assigning at least one carrier corresponding to said first nodes to a plurality of second nodes;"

"assigning at least one flight corresponding to said second nodes to a plurality of third nodes;"

"assigning at least one priceable unit corresponding to said third nodes to a plurality of fourth nodes; and"

"assigning at least one fare component corresponding to said fourth nodes to a plurality of leaf nodes."

The final Office Action admits that DeMarcken does not disclose the elements recited above. (Final Office Action, pg. 6, second paragraph.) However, the final Office Action asserts that it would have been obvious to one of ordinary skill in the art. For the numerous reasons described below, appellant disagrees.

The Final Office Action Fails to Identify Why It Would Be Obvious To One Of Ordinary Skill In The Art

In regard to the elements recited above, the final Office Action states that the DeMarcken storage structure "can be logically manipulated or combined and this would include assigning the nodes as set forth in Claims 2, 14, and 26." (Final Office Action, page 6, last paragraph.) In other words, the final Office Action summarily states that because the storage structure can be manipulated by a user, the particular elements in Claims 2, 14, and 26 are obvious.

Assuming that manipulating the storage structure could somehow be viewed as or used in adding specific trip information to partial fare solutions, which appellant expressly denies, appellant points out that the final Office Action provides no motivation or suggestion as to why one of ordinary skill in the art would modify DeMarcken to do so. A mere statement that a modification to the prior art would have been within the ordinary skill in the art "is not sufficient



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1420 Fifth Avenue
Suite 2800
Seattle, Washington 98101
206.682.8100

to establish a *prima facie* case of obviousness." *Ex parte Levengood*, 28 U.S.P.Q.2d 1300 (Bd. Pat. App. & Inter. 1993). See also, M.P.E.P. § 2143.01.

Moreover, Claims 2, 14, and 26 provide particular details in regard to the process of creating complete fare solutions by adding trip information to partial fare solutions. However, the final Office Action merely makes reference to the above-described enumeration aspects of DeMarcken, i.e., taking the compact representation of complete pricing-solutions and extracting out those pricing solutions that meet a user's criteria. Appellant asserts that this is yet another example of how the final Office Action consistently and erroneously confuses DeMarcken's ability to enumerate (**extract**) a subset of complete pricing solutions from a large, master set of complete pricing solutions with the present inventions process of building complete fare solutions through **adding** trip information to partial fare solutions.

DeMarcken Fails To Teach Or Suggest Assigning Fare Components To The Root Node

The final Office Action cites DeMarcken, Col. 7, lines 16-18; Figure 2, box 48; and Col. 5, lines 36-45, as support in finding the recitation "assigning the fare components corresponding to said root node to a plurality of first nodes." Appellant disagrees.

In regard to DeMarcken, Col. 7, lines 16-18, this passage makes mention of a "root node." However, the similarities between the present invention and this passage of DeMarcken end there. This passage describes the storage structure for the master set of **completed** pricing solutions, not partial fare solutions. Furthermore, this passage in DeMarcken makes absolutely no reference to assigning fare components to a root node. Of course, this would make no sense; as they are complete fare solutions, there is no more trip information to be added.

In regard to DeMarcken, Figure 2, box 48, this is a reference to the completed master set of pricing solutions generated by the scheduling process. Figure 2, box 48 makes no specific or general mention of "assigning fare components corresponding to said root node to a plurality of



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1420 Fifth Avenue
Suite 2800
Seattle, Washington 98101
206.682.8100

first nodes." Simply stated, it is not logically possible to view Figure 2, box 48 as assigning fare components to a root node, as Figure 2, box 48 references completed pricing solutions.

In regard to DeMarcken, Col. 5, lines 36-45, this passage discusses the compact representation of box 48, referred to as the DAG. As noted above, the DAG is simply an efficient storage structure of the superset of complete pricing solutions. Characterizing this passage as disclosing "assigning fare components corresponding to said root node to a plurality of first nodes" is unreasonable.

As mentioned above, a *prima facie* case of obviousness is made when (1) there is a suggestion or motivation to modify the reference, (2) there is a reasonable expectation of success, and (3) the cited reference teaches all elements of the rejected claims. Thus, appellant asserts that "assigning the fare components corresponding to said root node to a plurality of first nodes" is not obvious in view of DeMarcken because (a) DeMarcken fails to teach or suggest **adding** fare components to the root node, (b) the final Office Action has failed to recite any motivation suggestion to one of ordinary skill in the art to modify DeMarcken, and (c) the cited passages in DeMarcken could not be so modified as the cited DeMarcken passages each refer to completed pricing solutions, not incomplete, partial fare solutions.

DeMarcken Fails To Teach Or Suggest Assigning Carriers To A Set of First Nodes

The final Office Action cites DeMarcken, Figure 2, box 18; and Col. 15, lines 55-66, as support in finding the recitation "assigning at least one carrier corresponding to said first nodes to a plurality of second nodes." Appellant disagrees.

In regard to DeMarcken, Figure 2, box 18, and Col. 15, lines 55-66, this figure and reference refer to the above-described faring process, i.e., a process that validates the complete fares produced by the scheduling process. Appellant points out that the faring process works on



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1420 Fifth Avenue
Suite 2800
Seattle, Washington 98101
206.682.8100

complete pricing solutions. In contrast, the rejected element recites adding at least one carrier to a partial fare solutions.

Appellant asserts that "assigning at least one carrier corresponding to said first nodes to a plurality of second nodes" is not obvious in view of DeMarcken because (a) DeMarcken fails to teach or suggest **adding** carriers to incomplete, partial fare solutions (the first nodes), (b) the final Office Action has failed to recite any motivation suggestion to one of ordinary skill in the art to modify DeMarcken, and (c) the cited passages in DeMarcken could not be so modified as the cited DeMarcken references each refer to processes on completed pricing solutions, not incomplete, partial fare solutions.

<u>DeMarcken Fails To Teach Or Suggest Assigning Flights To A Set of Second Nodes</u>

The final Office Action cites DeMarcken, Figure 2, box 16; Col. 3, lines 55-66; and Col. 14, lines 1-6 as support for rejecting the recitation "assigning at least one flight corresponding to said second nodes to a plurality of third nodes." Appellant disagrees.

In regard to DeMarcken, Figure 2, box 16, this citation references the DeMarcken scheduling process. As previously discussed, the scheduler process generates the large superset of complete pricing solutions. However, DeMarcken does not describe what occurs internally within the scheduling process. Accordingly, DeMarcken fails to teach or suggest "assigning at least one flight corresponding to said second nodes to a plurality of third nodes," as recited in Claims 2, 14, and 26.

In regard to DeMarcken, Col. 3, lines 55-66, this passage describes a server process as including the scheduling process and the faring process to produce complete fare solutions that satisfy a request. As with Figure 2, box 16, previously discussed, this general, broad description



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1420 Fifth Avenue
Suite 2800
Seattle, Washington 98101
206.682.8100

of the DeMarcken system cannot reasonably be construed as teaching or suggesting "assigning at least one flight corresponding to said second nodes to a plurality of third nodes."

In regard to DeMarcken, Col. 14, lines 1-6, this passage describes the faring process that validates existing complete pricing solutions. This passage utterly fails to teach or suggest assigning flights to second level partial fare solutions to create third level partial fare solutions.

Appellant asserts that "assigning at least one flight corresponding to said second nodes to a plurality of third nodes" is not obvious in view of DeMarcken because (a) DeMarcken fails to teach or suggest **adding** flights to incomplete, partial fare solutions (the second nodes), and (b) the final Office Action has failed to recite any motivation suggestion to one of ordinary skill in the art to modify DeMarcken (if it is actually possible).

DeMarcken Fails to Teach or Suggest Assigning Priceable Units to a Third Set of Nodes

The final Office Action cites DeMarcken, Col. 3, lines 55-66, as support for rejecting the recitation "assigning at least one priceable unit corresponding to said third nodes to a plurality of fourth nodes." Appellant disagrees, and assert that the referenced passages make no such disclosure, teaching, or suggestion.

In regard to DeMarcken, Col. 3, lines 55-66, as mentioned above, this passage describes the server process as including the scheduling process and the faring process that produce complete flight solutions to satisfy a request. Absolutely no teaching or suggestion of assigning priceable units to partial fare solutions is made. General, broad descriptions cannot reasonably be construed as the specific equivalent of "assigning at least one priceable unit corresponding to said third nodes to a plurality of fourth nodes," as specifically recited in Claims 2, 14, and 26.

In view of the above reasons, appellant asserts that "assigning at least one priceable unit corresponding to said third nodes to a plurality of fourth nodes" is not obvious in view of



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1420 Fifth Avenue
Suite 2800
Seattle, Washington 98101
206.682.8100

DeMarcken because (a) DeMarcken fails to teach or suggest **adding** priceable units to incomplete, partial fare solutions (the third nodes), and (b) the final Office Action has failed to recite any motivation suggestion to one of ordinary skill in the art to modify DeMarcken (if such modification is actually possible).

DeMarcken Fails To Teach Or Suggest Assigning Fares To Fourth Level Nodes To Create Complete Fare Solutions

The final Office Action cites DeMarcken, Col. 10, lines 50-66, and Figure 19, as support for rejecting the recitation "assigning at least one fare corresponding to said fourth nodes to a plurality of leaf nodes." Appellant disagrees, asserting that the referenced passages make no such disclosure, teaching, or suggestion.

In regard to DeMarcken, Col. 10, lines 50-66, *The Faring System*, this passage discusses the faring process that "validates the fares for inclusion in the pricing solution." (DeMarcken, Col. 5, lines 5-6.) In other words, the faring process eliminates complete pricing solutions from the set of complete pricing solutions that are not valid. Thus, while this passage does use the term "fare," it is in a different context. DeMarcken's faring process deletes invalid complete pricing solutions from the superset of complete pricing solutions (according to fare information.) In contrast, the present invention adds fare information to incomplete, partial fare solutions (the fourth nodes) to create leaf nodes (i.e., complete fare solutions).

In view of the above reasons, appellant asserts that "assigning at least one fare corresponding to said fourth nodes to a plurality of leaf nodes" is not obvious in view of DeMarcken because (a) DeMarcken fails to teach or suggest **adding** fares to incomplete, partial fare solutions (the fourth nodes), and (b) the final Office Action has failed to recite any motivation suggestion to one of ordinary skill in the art to modify DeMarcken (if such modification is actually possible).



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1420 Fifth Avenue
Suite 2800
Seattle, Washington 98101
206.682.8100

In view of the above, appellant asserts that DeMarcken fails to teach or suggest each element of Claims 2, 14, and 26. Additionally, there is no motivation or suggestion to modify DeMarcken, if DeMarcken could be modified (which appellant expressly denies). Accordingly, appellant requests that the Board overturn the 35 U.S.C. § 103(a) rejection of Claims 2, 14, and 26, and direct that the claims be allowed.

**Issue 3: Whether Claims 4-8, 12, 16-20, 24, 28-32, and 36 Are Obvious In View Of DeMarcken and Sabre**

The final Office Action has rejected dependent Claims 4-8, 12, 16-20, 24, 28-32, and 36 as being obvious in view of DeMarcken and in further view of Sabre. For the following reasons, appellant disagrees.

As a preliminary matter, Claims 4-8 and 12 depend from independent Claim 1; Claims 16-20 and 24 depend from independent Claim 13; and Claims 28-32 and 36 depend from independent Claim 25. Thus, as appellant submits that the independent claims are allowable (as discussed above), appellant further submits that these dependent claims are also allowable, and requests that the Board overturn the 35 U.S.C. § 103(a) rejections and direct that the claims be allowed.

Claims 4-8, 12, 16-20, 24, 28-32, and 36 also include a myriad of recitations not disclosed, taught, or suggested by any of the cited and applied references, either alone or in combination, particularly when these recitations are considered in combination with the recitations of the independent claims from which they depend. Some of these further distinguishing recitations are described below.

Claims 4, 16, and 28

Claims 4, 16, and 28, were rejected under 35 U.S.C. § 103(a) as being unpatentable over DeMarcken et al. in view of Sabre. More particularly, it is stated in the Office Action that



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1420 Fifth Avenue
Suite 2800
Seattle, Washington 98101
206.682.8100

DeMarcken et al. fail to disclose that the "subset of complete fare solutions is an exhaustive set of said complete fare solutions." However, it is asserted that Sabre discloses that the subset of complete fare solutions is an exhaustive set of said complete fare solutions, and that it would be obvious to one skilled in the art to combine the teachings of DeMarcken et al. and Sabre. Appellant respectfully disagrees, and asserts that DeMarcken et al. and Sabre, alone and in combination, fail to teach or suggest this element of Claims 4, 16, and 28.

Sabre, page 2, lines 18-19, page 3, lines 1-2, and page 4, lines 17-22 are cited in support of the assertion made in the Office Action. However, these passages of Sabre do not teach or suggest that the subset of complete fare solutions returned to the consumer is an **exhaustive** set of complete fare solutions, or in other words, **all of the complete fare solutions**. Instead, these passages of Sabre disclose that a "large number of possibilities can be considered." (Sabre, page 4, lines 19-20.) Appellant asserts that considering a large number of possibilities is clearly patentably distinguishable from returning an exhaustive set of complete fare solutions generated by the additive process of the present invention.

For the reasons described above, appellant asserts that DeMarcken et al. and Sabre, alone and in combination, fail to teach or suggest each element of Claims 4, 16, and 28. Accordingly, appellant respectfully requests that the Board overturn the 35 U.S.C. § 103(a) rejections and direct that the claims be allowed.

<u>Claims 5, 17, and 29</u>

Claims 5, 17, and 29, were rejected under 35 U.S.C. § 103(a) as being unpatentable over DeMarcken et al. in view of Sabre. It is asserted in the Office Action that Sabre discloses that "adding trip information and eliminating partial fare solutions are performed in a recursive manner." Appellant respectfully disagrees, and asserts that DeMarcken et al. and Sabre, alone and in combination, fail to teach or suggest the above recited element.

Page 9, lines 13-14, and page 10, lines 2-4, of Sabre are cited in support of the assertion made in the Office Action. However, while these passages of Sabre purportedly teach recursively **extracting** *complete* solutions from a virtual network structure, Sabre fails to disclose, teach, or suggest "**adding** trip information [to *partial* fare solutions] and eliminating *partial* fare solutions" in a recursive manner, as recited in Claims 5, 17, and 29. Appellant asserts that **adding** trip information and eliminating *partial* fare solutions in a recursive manner is entirely distinct from **extracting** *complete* solutions in a recursive manner.

For the additional reasons described above, appellant asserts that DeMarcken et al. and Sabre, alone and in combination, fail to teach or suggest each element of Claims 5, 17, and 29. Accordingly, appellant respectfully requests that the Board overturn the 35 U.S.C. § 103(a) rejections and direct that the claims be allowed.

Claims 6, 18, and 30

Claims 6, 18, and 30, were rejected under 35 U.S.C. § 103(a) as being unpatentable over DeMarcken et al. in view of Sabre. It is asserted in the Office Action that Sabre discloses that "adding trip information and eliminating partial fare solutions are performed in an iterative manner." Appellant respectfully disagrees, and asserts that DeMarcken et al. and Sabre, alone and in combination, fail to teach or suggest the above recited element.

Page 9, lines 18-22, of Sabre are cited in support of the assertion made in the Office Action. This passage of Sabre describes each successive recursive operation of a search as an "iteration," all in the context of **extracting** *complete* solutions **from** a virtual network structure. In contrast, Sabre fails to disclose, teach, or suggest **adding** trip information and eliminating *partial* fare solutions in an iterative manner. Appellant asserts that **adding** trip information [to *partial* fare solutions] and eliminating *partial* fare solutions in an iterative manner is entirely distinct from **extracting** *complete* solutions from a structure in an iterative manner.



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CHRISTENSEN O'CONNOR JOHNSON KINDNESS^PLLC
1420 Fifth Avenue
Suite 2800
Seattle, Washington 98101
206.682.8100

For the additional reasons described above, appellant asserts that DeMarcken et al. and Sabre, alone and in combination, fail to teach or suggest each element of Claims 6, 18, and 30. Accordingly, appellant respectfully requests that the Board overturn the 35 U.S.C. § 103(a) rejections and direct that the claims be allowed.

Claims 7, 19, and 31

Claims 7, 19, and 31, were rejected under 35 U.S.C. § 103(a) as being unpatentable over DeMarcken et al. in view of Sabre. It is asserted in the Office Action that Sabre discloses that "said partial fare solutions are eliminated based on a threshold cost." Appellant respectfully disagrees, and asserts that DeMarcken et al. and Sabre, alone and in combination, fail to teach or suggest the above recited element.

Page 4, lines 17-23, page 9, lines 6-17, and page 11, lines 16-18, of Sabre are cited in support of the assertion made in the Office Action. These passages purportedly disclose a search algorithm that extracts *complete* solutions **from** a virtual network structure according to a lowest cost. However, contrary to the assertion made in the Office Action, these passages fail to disclose, teach, or suggest eliminating *partial* fare solutions based on a threshold cost, as recited in Claims 57, 19, and 31. Appellant asserts that extracting *complete* solutions from a structure according to a lowest cost is patentably distinguishable from eliminating *partial* fare solutions based on a threshold cost.

For the additional reasons described above, appellant asserts that DeMarcken et al. and Sabre, alone and in combination, fail to teach or suggest each element of Claims 7, 19, and 31. Accordingly, appellant respectfully requests that the Board overturn the 35 U.S.C. § 103(a) rejections and direct that the claims be allowed.

Claims 8, 20, and 32

Claims 8, 20, and 32, were rejected under 35 U.S.C. § 103(a) as being unpatentable over DeMarcken et al. in view of Sabre. It is asserted in the Office Action that Sabre discloses that

"said partial fare solutions are eliminated based on a refined lower bound." Appellant respectfully disagrees, and asserts that DeMarcken et al. and Sabre, alone and in combination, fail to teach or suggest the above recited element.

Page 9, line 6 – page 12, line 11, of Sabre are cited in support of the assertion made in the Office Action. Similar to those passages of Sabre discussed above in regard to Claims 7, 19, and 31, these passages of Sabre discloses a search algorithm to extract *complete* solutions from a virtual network structure. Contrary to the assertion made in the Office Action, these passages do not disclose eliminating *partial* fare solutions based on a refined lower bound, as recited in Claims 8, 20, and 32. Appellant asserts that extracting the lowest priced *complete* solutions from a structure is patentably distinguishable from eliminating *partial* fare solutions based on a refined lower bound.

For the additional reasons described above, appellant asserts that DeMarcken et al. and Sabre, alone and in combination, fail to teach or suggest each element of Claims 8, 20, and 32. Accordingly, appellant respectfully requests that the Board overturn the 35 U.S.C. § 103(a) rejections and direct that the claims be allowed.

Claims 12, 24, and 36

Claims 12, 24, and 36, were rejected under 35 U.S.C. § 103(a) as being unpatentable over DeMarcken et al. in view of Sabre. It is asserted in the Office Action that Sabre discloses that adding trip information and eliminating partial fare solutions "are performed both backward and forward from destination to origin." Appellant respectfully disagrees, and asserts that DeMarcken et al. and Sabre, alone and in combination, fail to teach or suggest the above recited element.

Page 3, lines 13 - 18, of Sabre are cited in support of the assertion made in the Office Action. However, this passage simply states that the processor "constructs a virtual network representing one or more paths between origin and destination," "traverses the one or more paths



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1420 Fifth Avenue
Suite 2800
Seattle, Washington 98101
206.682.8100

between the origin and destination," and "designates a traversed path between the origin and destination." This passage does not disclose that adding trip information and eliminating partial fare solutions "are performed both backward and forward from destination to origin." In fact, by repeatedly referring to paths between "the origin and destination" and not referring to or even suggesting paths between "the destination and the origin," this passage implies that the paths that are constructed and traversed in the forward direction only. Accordingly, appellant asserts that DeMarcken et al. and Sabre, alone and in combination, fail to teach or suggest that adding trip information and eliminating partial fare solutions "are performed both backward and forward from destination to origin," as recited in Claims 12, 24, and 36. Accordingly, appellant respectfully requests that the Board overturn the 35 U.S.C. § 103(a) rejections and direct that the claims be allowed.

**Issue 4: Whether The Proposed Amendments to Claims 1 and 25 Recite Statutory Subject Matter As Required By 35 U.S.C. § 101 and 112, Second Paragraph**

The final Office Action rejected Claims 1-12, and 25-36 under 35 U.S.C. § 101 as being directed to non-statutory subject matter. In particular, while the final Office Action admits that statutory subject matter is recited in the preambles of the claims, particularly Claims 1 and 25, the final Office Action insisted that the statutory subject matter be positively recited in the body of the claims.

Correspondingly, the final Office Action rejected Claims 1-12 and 25-36 under 35 U.S.C. § 112, second paragraph as being indefinite for failing to particularly point out and distinctly claim the subject matter which is regarded as the invention. While the final Office Action does not explicitly elaborate its reasons for this rejection, appellant believes that this 35 U.S.C. § 112, second paragraph, rejection is intimately connected to the 35 U.S.C. § 101 rejection, i.e., that statutory subject matter be recited in the body of the claims.



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1420 Fifth Avenue
Suite 2800
Seattle, Washington 98101
206.682.8100

In order to be fully responsive to the final Office Action, on May 10, 2004, appellant submitted an Amendment and Response After Final Rejection (hereafter "response") in conjunction with a Notice of Appeal. In the response, Claims 1 and 25 were amended to positively recite statutory subject matter in the body of the claims. According to the Advisory Action of June 22, 2004, these amendments were refused entry as they would "raise new issues that would require further consideration and/or search." (Advisory Action, part 2(a).)

As can be seen in Appendix X, Appendix of Claims Involved In The Appeal, Claim 1 was amended such that the statutory subject matter that was previously recited in the preamble is moved into the body of the claim. Claim 25 was also amended such that components of an apparatus were recited in the body of the claim. Appellant notes that, in regard to Claim 25, while the amended language is more specific than what was previously described in the preamble, the entire prosecution of this claim, as well as its dependent claims, has been directed and made in the context of computers, i.e., an apparatus that includes a processor and a memory storing program code.

Appellant was surprised that the Advisory Action stated that a new search or consideration would be required if the amendments were entered. Appellant believed that the proposed amendments (1) complied with the Examiner's requests that the statutory subject matter be recited in the body of the claims, (2) was a *bona fide* effort to be responsive to all issues raised in the final Office Action, (3) did not raise additional limitations or material not already **considered** by the Examiner in the prosecution of the application and particularly the claims, and therefore, (4) would simplify and/or reduce the number of issues to be addressed by the Board on appeal.

Appellant submits that the proposed amendments, as identified in Appendix X, Appendix of Claims Involved in the Appeal, recite statutory subject matter as required by 35 U.S.C. §§ 101 and 112, second paragraph. Therefore, appellant requests that the Board direct that the



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CHRISTENSEN O'CONNOR JOHNSON KINDNESS[PLLC]
1420 Fifth Avenue
Suite 2800
Seattle, Washington 98101
206.682.8100

previously submitted amendments be entered, and the 35 U.S.C. § 101, and 35 U.S.C. § 112, second paragraph, rejections of Claims 1-12, and 25-36, be overturned.

## IX. CONCLUSION

In view of the foregoing remarks, appellant asserts that all of the pending claims of the present application are clearly patentably distinguishable from DeMarcken and Sabre. Appellant further asserts that the pending claims, as amended according to the proposed amendments identified in Appendix X, Claims Involved in the Appeal, satisfy the requirements of 35 U.S.C. § 101 and § 112, second paragraph. Accordingly, appellant requests that the Board overturn the rejections of the final Office Action and direct that the pending claims be allowed.

Respectfully submitted,

CHRISTENSEN O'CONNOR
JOHNSON KINDNESS[PLLC]

Maria L. Čulić Anderson

Maria L. Čulić Anderson
Registration No. 40,574
Direct Dial No. 206.695.1714

I hereby certify that this correspondence is being deposited with the U.S. Postal Service in a sealed envelope as first class mail with postage thereon fully prepaid and addressed to Mail Stop AF, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on the below date.

Date: July 12, 2004 Lori A. Lewis

MCA/TSP:lal

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1420 Fifth Avenue
Suite 2800
Seattle, Washington 98101
206.682.8100

## X. APPENDIX OF CLAIMS INVOLVED IN THE APPEAL

1. (Currently amended) In a communications network including a client ~~computer~~ application and a query server computer, a method~~, executed by the query server computer in response to a fare query received from the client computer,~~ for finding at least one best fare for a trip, the method comprising:

at the query server computer, in response to a fare query received from the client application:

determining a set of partial fare solutions for the trip;

adding trip information to the partial fare solutions in order to define a set of complete fare solutions for the trip;

as trip information is added to the partial fare solutions, eliminating partial fare solutions that are non-optimal partial solutions; and

returning a subset of said complete fare solutions as the best fares for the trip.

2. (Previously presented) The method of claim 1, wherein adding trip information comprises:

supplying the fare query to a root node in a solution tree;

assigning fare components corresponding to said root node to a plurality of first nodes;

assigning at least one carrier corresponding to said first nodes to a plurality of second nodes;

assigning at least one flight corresponding to said second nodes to a plurality of third nodes;

assigning at least one priceable unit corresponding to said third nodes to a plurality of fourth nodes; and

assigning at least one fare corresponding to said fourth nodes to a plurality of leaf nodes.



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1420 Fifth Avenue
Suite 2800
Seattle, Washington 98101
206.682.8100

3. (Original) The method of claim 1, wherein said subset of complete fare solutions is a predetermined number of lowest cost fare solutions.

4. (Original) The method of claim 1, wherein said subset of complete fare solutions is an exhaustive set of said complete fare solutions.

5. (Original) The method of claim 1, wherein adding trip information and eliminating partial fare solutions are performed in a recursive manner.

6. (Original) The method of claim 1, wherein adding trip information and eliminating partial fare solutions are performed in an iterative manner.

7. (Original) The method of claim 1, wherein said partial fare solutions are eliminated based on a threshold cost.

8. (Original) The method of claim 1, wherein said partial fare solutions are eliminated based on a refined lower bound.

9. (Original) The method of claim 1, wherein said partial fare solutions are stored in a priority queue.

10. (Original) The method of claim 1, wherein said complete fare solutions are retrieved from a priority queue.

11. (Original) The method of claim 1, wherein adding trip information and eliminating partial fare solutions are performed as part of a branch-and-bound best fare search routine.

12. (Original) The method of claim 1, wherein adding trip information and eliminating partial fare solutions are performed both backward and forward from a destination and origin.

13. (Previously presented) A computer-readable medium containing computer-executable instructions, which, when executed by a query server in response to a fare query, carry out the method for finding at least one best fare for a trip, comprising:



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1420 Fifth Avenue
Suite 2800
Seattle, Washington 98101
206.682.8100

determining a set of partial fare solutions for the trip;

adding trip information to the partial fare solutions in order to define a set of complete fare solutions for the trip;

as trip information is added to the partial fare solutions, eliminating partial fare solutions that are non-optimal partial solutions; and

returning a subset of said complete fare solutions as the best fares for the trip.

14. (Previously presented) The computer-readable medium of claim 13, wherein adding trip information comprises:

supplying the fare query to a root node in a solution tree;

assigning fare components corresponding to said root node to a plurality of first nodes;

assigning at least one carrier corresponding to said first nodes to a plurality of second nodes;

assigning at least one flight corresponding to said second nodes to a plurality of third nodes;

assigning at least one priceable unit corresponding to said third nodes to a plurality of fourth nodes; and

assigning at least one fare corresponding to said fourth nodes to a plurality of leaf nodes.

15. (Previously presented) The computer-readable medium of claim 13, wherein said subset of complete fare solutions is a predetermined number of lowest cost fare solutions.

16. (Previously presented) The computer-readable medium of claim 13, wherein said subset of complete fare solutions is an exhaustive set of said complete fare solutions.

17. (Previously presented) The computer-readable medium of claim 13, wherein adding trip information and eliminating partial fare solutions are performed in a recursive manner.



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1420 Fifth Avenue
Suite 2800
Seattle, Washington 98101
206.682.8100

18. (Previously presented) The computer-readable medium of claim 13, wherein adding trip information and eliminating partial fare solutions are performed in an iterative manner.

19. (Previously presented) The computer-readable medium of claim 13, wherein said partial fare solutions are eliminated based on a threshold cost.

20. (Previously presented) The computer-readable medium of claim 13, wherein said partial fare solutions are eliminated based on a refined lower bound.

21. (Previously presented) The computer-readable medium of claim 13, wherein said partial fare solutions are stored in a priority queue.

22. (Previously presented) The computer-readable medium of claim 13, wherein said complete fare solutions are retrieved from a priority queue.

23. (Previously presented) The computer-readable medium of claim 13, wherein adding trip information and eliminating partial fare solutions are performed as part of a branch-and-bound best fare search routine.

24. (Previously presented) The computer-readable medium of claim 13, wherein adding trip information and eliminating partial fare solutions are performed both backward and forward from a destination and origin.

25. (Currently amended) A query server apparatus in a communications network for finding at least one best fare for a trip in response to a fare query, the apparatus ~~operative to~~ comprising:

a processor; and

a memory, coupled to the processor, storing program code which, when executed by the processor and in response to the fare query, causes the query server apparatus to:

determine a set of partial fare solutions for the trip;



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1420 Fifth Avenue
Suite 2800
Seattle, Washington 98101
206.682.8100

add trip information to the partial fare solutions in order to define a set of complete fare solutions for the trip;

as trip information is added to the partial fare solutions, eliminate partial fare solutions that are non-optimal partial solutions; and

return a subset of said complete fare solutions as the best fares for the trip.

26. (Previously presented) The apparatus of claim 25, wherein adding trip information comprises:

supplying the fare query to a root node in a solution tree;

assigning fare components corresponding to said root node to a plurality of first nodes;

assigning at least one carrier corresponding to said first nodes to a plurality of second nodes;

assigning at least one flight corresponding to said second nodes to a plurality of third nodes;

assigning at least one priceable unit corresponding to said third nodes to a plurality of fourth nodes; and

assigning at least one fare corresponding to said fourth nodes to a plurality of leaf nodes.

27. (Original) The apparatus of claim 25, wherein said subset of complete fare solutions is a predetermined number of lowest cost fare solutions.

28. (Original) The apparatus of claim 25, wherein said subset of complete fare solutions is an exhaustive set of said complete fare solutions.

29. (Original) The apparatus of claim 25, wherein adding trip information and eliminating partial fare solutions are performed in a recursive manner.

30. (Original) The apparatus of claim 25, wherein adding trip information and eliminating partial fare solutions are performed in an iterative manner.



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1420 Fifth Avenue
Suite 2800
Seattle, Washington 98101
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31. (Original) The apparatus of claim 25, wherein said partial fare solutions are eliminated based on a threshold cost.

32. (Original) The apparatus of claim 25, wherein said partial fare solutions are eliminated based on a refined lower bound.

33. (Original) The apparatus of claim 25, wherein said partial fare solutions are stored in a priority queue.

34. (Original) The apparatus of claim 25, wherein said complete fare solutions are retrieved from a priority queue.

35. (Original) The apparatus of claim 25, wherein adding trip information and eliminating partial fare solutions are performed as part of a branch-and-bound best fare search routine.

36. (Original) The apparatus of claim 25, wherein adding trip information and eliminating partial fare solutions are performed both backward and forward from a destination and origin.



LAW OFFICES OF
CHRISTENSEN O'CONNOR JOHNSON KINDNESS[PLLC]
1420 Fifth Avenue
Suite 2800
Seattle, Washington 98101
206.682.8100